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FAMILY LYCEUM.

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EVENING ENTERTAINMENTS.

SEVENTH EVENING.

On the following evening, Mr. Oakley's family circle being again assembled, Edward inquired of his father whether the bear skin which he had mentioned on the preceding evening was considered a valuable sort of clothing among the Russians.

Mr. Oakley.—Valuable, but not costly.—The fur of the sable is far more costly.—Their skins, according to Bauer, are more precious than cloth of gold, insomuch that forty of the best quality, which is the quantity usually packed in one bale, have been sold for more than a thousand pieces of gold.

Edward.—Well may the hardy Siberian creep along upon the snow and hide behind the drifts, to obtain a shot at one of these animals.

Mr. O.—We have as yet contemplated those people only who are savages, or those who may be termed half savages, whose industry and perseverance surmount the difficulties which their soil and climate present: you have seen that these people are ignorant even of the most trifling conveniences of life, and without which we could scarcely exist. I will only instance one of these articles, *Bread.* We should consider ourselves hardly used, to be reduced to live upon that alone, and yet how many people are there who are ignorant of its existence. How delighted would they be to substitute it for the coarse food which is their daily nourishment. The Greenlanders and Samoiedes feed wholly upon fish; the Kamtschatdales make a paste from the bark of the birch-tree; and the Tonguese, who inhabit the banks of the river Lena in Siberia, have no other bread than that which they make from the bulbous roots of the yellow lily. In Lapland an attempt has been made to introduce a bread made of the reindeer moss and Iceland moss; by repeatedly baking these mosses, they lose their natural bitterness; when dried they are reduced to powder, and formed into a kind of paste, either alone, or mixed with pearl barley, oats, or rye.

The Swedish Laplanders are sometimes reduced to such necessity as to live upon a kind of broth made from the bark of the birch-tree and the fat of the reindeer.—When they can add to this a little sheep's milk and the juice of a berry from which they extract a palatable liquid, this mess becomes almost a dainty to their palates. The Nogay Tartars eat fish dried in the sun instead of bread. The people of Gallas, who inhabit the country bordering upon Abyssinia, make balls of baked coffee mixed up with fat. They generally carry a bag about with them containing balls of this description. The Tartars of the Crimea adopt this food; and the Californians make a kind of chocolate of a species of oily berry they possess, which serves them instead of bread.

Among the Moors of Senegal, gum forms their principal food during the greater part of the year; but what will you say to a people, who, instead of bread, eat earth?

Charles & Eliza.—Oh, what a strange food!

Edward.—What an extraordinary taste they must have to eat earth.

Mr. O.—These people do not eat all earths indiscriminately; they choose a kind of clay, called amongst the negroes *Abou*, and it is sold in the West Indies in the markets: they knead it into balls or cakes, and gradually bake it, moistening it occasionally. This strange custom is not confined to the negroes of Africa, nor to the inhabitants of New California; for the Otomacks, who live on the banks of the Oronooko, and the river La Meta in South America, have recourse to the same extraordinary, and to us, unpalatable food. In the rainy season, when these rivers overflow their banks, all fishing is interrupted, and during the two or three months of this flood the savages live upon clay; sometimes, indeed, they vary this repast with the roots of the fern, a stray fish, or a small lizard.

Caroline.—And this food supports life!

Mr. O.—It satisfies the appetite, but its effect upon the human body is pitiable; it renders it thin and spare; yet there are people with whom it does not appear to disagree. The Otomacks are extremely fond of it, they have always a store of it by them, and when the fishing season returns, they do not wholly relinquish their repast of clay.

Another singular fact is the conversion of *lime* into food, which is used for that purpose in South America. This lime, made from burned and powdered shells, is sold in large quantities in their markets. The savages of this country make long journeys without troubling themselves about food at all: they carry with them a bag of this lime powder and cocoa leaves; and travellers assert that this strange food satisfies hunger, although it does not nourish the body.

It is the same with liquids as with solids: wine or beer would be a delicious nectar to a people who are obliged to melt snow, to steep mushrooms, or boil fish, or extract the oil of the seal and whale for their drink.—When Captain Cook touched at New Zealand, the inhabitants who came on board his vessels, emptied the lamps and drank the oil, and took long draughts of the same liquid from the casks which contained it. In North America, the natives extract a wholesome and agreeable beverage from the branches of the young fir-trees: and the Croatians, who have forests of plum-trees, make a species of brandy from their fruit.

Was I not therefore right, when I said there were people who were ignorant of those things which we consider among the first necessaries of life?

Caroline.—Indeed you were, papa: but I hope that we shall now be entertained with a different account, and that we are drawing towards the third step of your imaginary ladder.

Mr. O.—Your hopes shall be realized; for the nations I am about to treat of are more amply provided by nature with the necessaries of life, and industry has by cultivation increased them. The Moorish tribes, who inhabit the borders of Senegal in Africa, have in some degree rendered the Europeans tributary to them, by the production of one single species of tree, and to which they are also indebted themselves for food. I mean the gum arabic tree, as it is called, belonging to the acacia tribe, of which there are forty species: it is spread all along the coast from Cape Blanc to Cape Verd; but it forms principally three great forests, which are the property of three distinct tribes of Moors; and it is to these people the Europeans are obliged to address themselves for this article, which is of indispensable utility in our arts and manufactures generally, but above all in dying, painting, and the fabrication of certain stuffs, on account of its glutinous quality, which gives a fineness of texture and a lustrous appearance.

Edward.—Is this gum found only in Senegal?

Mr. O.—All the countries within the tropics produce this species: Arabia abounds in it particularly; and, in fact, it has derived its name of Gum Arabic from the circumstance of its having been first imported from that country. Indeed, it is not above one hundred years ago that it was known to be so abundant in Senegal.

The Senegal gum is by far the finest; there are two kinds of it, the red and the white. After the rainy and stormy season is over, which begins in July and lasts till November, the wind is so violent and so parching, that the woods crack and split with a violent noise. The bark of the acacias thus split, the juice exudes quickly, and remains attached to the bark in the form of a limpid brilliant drop. At the beginning of December, this gum *harvest* is ready to be gathered: then the Moors, who claim the three great forests, quit their deserts and repair thither in crowds, leaving behind them the old men and the children only as the guardians of their flocks and slaves. Their expedition resembles one of a warlike cast: the princes and chiefs mount camels, their wives are seated in a kind of basket, surmounted by a canopy, affixed to the backs of the same kind of animal; others are mounted on horses or oxen, while the common people follow on foot. A troop of Moors, armed with long lances, are deputed to keep order amidst this singular caravan. In about ten days their march is completed; they then pitch their tents in front of the forest, and make preparations for their intended operations. From this moment the fresh gum forms the principal article of their food; they either suck it alone, or mixing it with milk and the juice of meats, form it into cakes, which keep a considerable time. Having dispersed themselves in the forests, they are six weeks engaged in collecting the gum, and in filling their large leather sacks, with which they load their beasts. When the *harvest*, for I must use that expression, is complete, and a day of meeting is agreed upon between the Europeans and the Moors, they repair towards the mouth of the Senegal, but principally bending their steps to the factory, called 'The Stair, or Ladder of the Desert,' where the French nation has principally established this traffic of Gum Arabic. Early on the day fixed upon for the market, the caravan is in motion, a cloud of dust announces its approach; the desert itself seems animated: the noise of the beasts, which are ornamented with boughs of acacia; the singular appearance of the motley group, the eagerness of their actions, accompanied by their unceasing garrulity, altogether form a scene of the most singular description. The beasts of burden are quickly unloaded of the sacks, which are carried to the ships, where their contents are measured in large tubs, called *cantars:* these tubs are fastened upon deck; and, when the merchandise is bought, it is by means of a groove easily removed to the hold of the vessel. This gum is not paid for in specie, but is exchanged for different kinds of calico. Until the sale commences, the Europeans and Moors are the best friends in the world, but the moment that self-interest begins to act upon either party, the tumult becomes so great that it is indescribable. The Moors have recourse to all kinds of artifices to throw the merchants off their guard:—they climb the vessel, tumultuously scream, and, brandishing their daggers, threaten to compel them to submit to their terms of traffic. Sometimes it is necessary to fire the guns, and to arm the sailors, in order to prevent these depredators from carrying their point. But the love of gain induces men to submit to this disagreeable treatment, and the value of the gum which is annually purchased amounts to an hundred thousand livres. It is supposed that the forests of Senegal alone could produce gum to the amount of two millions of livres, besides that which the Moors gather for themselves as food, and as a remedy for many disorders.

THE HORSE.

THE first breaking of the horse for riding is attributed by some authors to the Lapithæ, and is spoken of by Virgil in his third Georgic, thus translated by Dryden, line 177:—

'Bold Erichthonius was the first who join'd
Four horses for the rapid race design'd,
And o'er the dusty wheels presiding sat:
The Lapithæ to chariots add the state
Of bits and bridles; taught the steed to bound,
To run the ring, and trace the mazy round,
To stop, to fly, the rules of war to know,
T' obey the rider, and to dare the foe.'

Authors are, however, much divided as to the period when men first began to mount horses for the purpose of riding. From the writings of Homer we learn, that, long before his time, the horse was used to the saddle. He is said to have flourished about 168 years after the Trojan war, or, according to others, 160 years before the foundation of Rome. Paterculus says, he lived 968 years before the Christian era, and Herodotus, 884 years, and cotemporary with Hesiod. Homer, in a metaphor, in the fifteenth book of the Iliad, compares the strength of Ajax, flying from ship to ship, to that of a horseman on a strong steed, which is thus expressed in Pope's translation:—

'Nor fights, like others, fix'd to certain stands,
But looks a moving tower above the bands;
High on the decks, with vast gigantic stride,
The godlike hero stalks from side to side.
So, when a horseman, from the watery mead,
(Skill'd in the manage of the bounding steed,)
Drives four fair coursers, practised to obey,
To some great city, through the public way;
Safe in his art, as side by side they run,
He shifts his seat, and vaults from one to one;
And now to this, and now to that he flies;
Admiring numbers follow with their eyes.'

Strabo asserts, that the Medes, Persians, and Armenians, were the first that invented the art of riding and shooting. Polydorus ascribes it to Bellerophon; Lysias, the orator, to the Amazonian women. But be this as it may, we find, from the ancient historians and poets, that riding must have been early cultivated as an art; and those who excelled in it attracted the attention of the greatest men of antiquity. Among the names of celebrated horsemen in ancient times, we find, Automedon, servant of Achilles; Idaeus, servant to Pardimus; Metiocus, servant to Turnus, a king of Rutuli; Myrtilus, servant to Oenomaus, a son of Mars; Ceberes, servant to Darius, the noble satrap of Persia; and Anniceris, servant to Cyraneus.

It appears to have been after the use of horses for riding, that the term courser was employed, which is now in general use for all eastern horses.

I think it indisputable, that horses were not used for riding till long after the time they were harnessed in war-chariots. Sir Gore Ouseley mentions, in his travels through Persia and various countries of the East, that he examined all the relics of antiquity, and amongst others the fine sculptures on the ruins of Persepolis, from which he drew the conclusion, at once interesting, and in some measure confirmatory of the opinion above noticed, that the horse has been gradually subdued. He says, 'There are no figures mounted on horseback, although some travellers have mentioned horsemen among those sculptures. One would think, that the simple act of mounting on a horse's back would naturally have preceded the use of wheel carriages, and their complicated harness; yet no horsemen are found at Persepolis; and we know Homer's horses are represented in chariots, from which the warriors sometimes descended to combat on foot; but the poet has not described them as fighting on horseback. The absence of mounted figures might authorize an opinion, that these sculptures had been executed before the time of Cyrus, whose precepts and example first inspired the Persians with a love of equestrian exercises, of which, before his time, they were totally ignorant.'

It is a generally received, although erroneous opinion, that Arabia was the native country of the horse; but this we find not to be the case, from what is stated in 2 Chronicles, chap. ix., which informs us that King Solomon obtained gold and silver from that country; and in the 28th verse, that 'they brought unto Solomon horses out of Egypt, and out of all lands.' Now, had they originally come from Arabia, it is probable that country would have been here expressly mentioned. Even so late as the seventh century of the Christian era, when the prophet Mahomet attacked the Koreish, not far from Mecca, he had only two horses in his train; and although, in the plunder of this horrible campaign, he carried with him in his retreat twenty-four thousand camels, forty thousand sheep, and twenty-four thousand ounces of silver, there is no mention of horses being part of the booty. We are informed that the Arabians had but few horses, and those not at all valued; so that Arabia, where are now the most celebrated coursers in the world, is comparatively of modern date as a breeding country. In the second century, horses were exported from Egypt to Arabia, as presents to various of their kings; and there can be little doubt that their finest horses were originally the produce of Egypt, whence they were also exported to Ethiopia, India, Persia, Parthia, Armenia, Scythia, &c. Solomon is said to have had 'four thousand stalls for horses and chariots, and twelve thousand horsemen.' The price of an Egyptian horse in those days was one hundred and fifty shekels of silver, which amounts to about seventeen pounds two shillings sterling; a very large sum at that remote period.

Solomon's suite of stables seems to have been magnificent. He kept horses both for pomp and gain. His stud, even in our own times, is unequalled: it was supplied to him from two sources. Part of the revenues of his kingdom were appropriated to the purchase of steeds; and the surrounding princes gave him many in presents. He obtained numbers from Egypt, which then abounded in horses; but I think it more than probable, that the Egyptians obtained their best steeds from the south, as the local situation of that country was but ill adapted to preserve them in perfection. This monarch, as well as several of his successors, obtained coursers from Togarmah, now understood to be the modern Cappadocia, or the lands which border the south-east of the Euxine Sea. In that tract of country, and all Natolia, the value and uses of the horse were early known, and every

means were employed to improve and preserve the breed; as that country was, in these early times, the seat of several flourishing and powerful kingdoms.

Left only to conjecture, we can but suppose, from a combination of circumstances, that Asia was the original country of the horse; for there he is found, to the present day, roving in unrestrained freedom: and we are without any historical record of his having been introduced by man into those wilds. One thing is quite certain, that he was not found either in America or New Holland, at the original discovery of these continents. The great tracts of desert country around the Sea of Arel, and the Caspian Sea, have been supposed to be the native residence of the horse; but, if this conjecture be correct, he must have widely extended his geographical range, for he is found in a wild state in Asia, as far north as the sixtieth degree, and to the utmost southern extremes of that vast continent, and also in many parts of Africa; but we must suppose, that those of the former country emigrated as the species multiplied.

The Sybarites, a powerful people, who flourished above five hundred and fifty years before the Christian era, had a fine breed of horses, and their cavalry was numerous.—Caelius tells us that this people became extremely licentious, and taught their horses to dance to the sound of pipes, at their common feasts. The Sybarites went to war with the town of Cretona, and were ultimately subdued and annihilated by the Cretoniats, who, at the onset, ordered a number of pipers and minstrels to play, which caused all the Sybarite horses to dance among their adversaries, so that they became an easy conquest. This happened five hundred and eight years before Christ.

The Amazons, a nation of famous women, who flourished about five hundred years before Christ, and who founded an extensive empire in Asia Minor, were celebrated equestrians, and had a fine breed of horses.

Herodotus, who wrote in the fifth century before our Saviour, informs us, that the Ethiopians had a good breed of horses, and that they were even equestrians. The same author tells us, that the Indians were accustomed to the use of horses from very remote periods; and that the soldiers of that country, who attended Xerxes in his celebrated march against the Grecians, fought on horseback, besides using war-chariots.

The same author says, that the ancient Persian horses were famous for their beauty, vigor, fire, and other qualities, and so celebrated on account of their speed, that the name of a horse, in that country, is *Asbaca*, or *wind-foot*, a term very expressive of the great speed of the coursers. So essential did that people consider the accomplishment of riding, that they taught their children to mount a horse at five years of age. We are informed by Vegetius, a writer who flourished three hundred and eighty-six years before Christ, that the horses of Persia were famous on account of their excellence for the saddle, being very sure-footed, extremely gentle, and easy and graceful in their motion, which was something between a gallop and an amble; and to those who cultivated the best breed, they proved a great source of emolument: they were not, however, able to stand the fatigues of a long journey.

Xenophon, a celebrated Athenian general, historian, and philosopher, who lived in the fourth century before Christ, considered it necessary to teach all the war-horses to swim, rear, kick, and bite, at the will of their riders; which practice prevailed amongst other nations in those times. This general led the Greek army, while eluding the sudden attacks of the numerous Persians, across the most rapid rivers in safety; he penetrated through vast deserts, and ascended the steepest mountains, to refresh and secure for a while his tired companions.

Useful Discovery.

A machine has been invented and put in operation, in Philadelphia, for napping hats by steam. The editor of the Philadelphia Inquirer, recently witnessed the performance of this machine, in a hat manufactory, and speaks in high terms of its capabilities. The beauty and superiority of the work, are at once admitted by all who have examined it. It is not stated whether or not the process is more rapid than by the old method; but it is held to turn out a much better article; as the napping process requires very hot water, steam applied to the same purpose may be many degrees hotter than boiling water. The invention is thought to be a very useful one.

THE ARTS.

INKS.

Ink has not only been useful in all ages, but still continues absolutely necessary to the preservation and improvement of every art and science, and for conducting the ordinary transactions of life.

Daily experience shews, that the most common objects generally prove most useful and beneficial to mankind. The constant occasion we have for ink, evinces its convenience and utility. From the important benefits arising to society from its use, and the injuries individuals may suffer from the frauds of designing men in the abuse of this necessary article, it is to be wished that the legislature would frame some regulation to promote its improvement, and prevent knavery and avarice from making it instrumental to the accomplishment of any base purposes.

Simple as the composition of ink may be thought, and really is, it is a fact well known, that we have at present none equal in beauty and color to that used by the ancients; as will appear by an inspection of many of the MSS. above quoted, especially those written in England in the times of the Saxons. What occasions so great a disparity? Does it arise from our ignorance, or from our want of materials? From neither, but from the negligence of the present race; as very little attention would soon demonstrate, that we want neither skill nor ingredients to make ink as good now as at any former period.

It is an object of the utmost importance that the records of parliament, the decisions and adjudications of the courts of justice, conveyances from man to man, wills, testaments, and other instruments which affect property, should be written with ink of such durable quality, as may best resist the destructive powers of time and the elements.—The necessity of paying greater attention to this matter, may be readily seen by comparing the rolls and records that have been written from the fifteenth century to the end of the seventeenth, with the writings we have remaining of various ages from the fifth to the twelfth centuries. Notwithstanding the superior antiquity of the latter, they are in excellent preservation; but we frequently find the former, though of more modern date, so much defaced, that they are scarcely legible.

Inks are of various sorts, as encustic or varnish, Indian ink, gold and silver, purple, black, red, green, and various other colors: there are also secret and sympathetic inks.

The ink used by the ancients had nothing in common with ours, but the color and gum. Gall nuts, copperas, and gum, make up the composition of our ink; whereas soot, or ivory black, was the chief ingredient in that of the ancients; so that very old charters might be suspected, if written with ink entirely similar to what we use; but the most acute and delicate discernment is necessary in this matter, for some of the inks formerly used were liable to fade and decay, and are found to have turned red, yellow, or pale: those imperfections are however rare in MSS. prior to the tenth century.

There is a method of reviving the writing, but this expedient should not be hazarded, lest a suspicion of deceit should arise, and the support depended on be lost.

Golden ink was used by various nations, as may be seen in several libraries, and in the archives of churches. Silver ink was also common in most countries. Red ink, made of vermilion, cinnabar, or purple, is frequently found in the MSS. but none are found written entirely with ink of that color. The capital letters are made with a kind of varnish which seems to be composed of vermilion and gum. Green ink was rarely used in charters, but often in Latin MSS. especially in those of the latter ages: the guardians of the Greek emperors made use of it in signatures, till the latter were of age. Blue or yellow ink was seldom used but in MSS. The yellow has not been in use, as far as we can learn, for six hundred years.

Metallic and other characters were sometimes burnished. Wax was used as a varnish by the Latins and Greeks, but much more by the latter, with whom it continued a long time. This covering or varnish was very frequent in the ninth century.

COLOR.

The color of the ink is of no great assistance in authenticating MSS. and charters. There is, says Mr. Astle, in my library, a long roll of parchment, at the head of which is a letter, that was carried over the greatest part of England, by two devout monks, requesting prayers for Lucia de Vere, countess of Oxford, a pious lady, who died in 1199; who had founded the house of Hen-ningham, in Essex, and done many other acts of piety. This roll consists of many membranes or skins of parchment sewed together; all of which, except the first, contain certificates from the different religious houses, that the two monks had visited them, and that they had ordered prayers to be offered up for the Countess, and had entered her name in their bead-rolls. It is observable, that time hath had very different effects on the various inks, with which these certificates were written; some are as fresh and black as if written yesterday, others are changed brown, and some are of a yellow hue. It may naturally be supposed, that there is a great variety of hand-writings upon this roll; but the fact is otherwise, for they may be reduced to three.

The letter at the head of the roll is written in modern Gothic characters: four-fifths of the certificates are Norman, which shews that this mode of writing had taken place of almost every other. Some of the certificates are in modern Gothic letters, which we conceive were written by English monks; and a very few are in Lombardic small letters. It may however be said in general, that black ink of the seventh, eighth, ninth, and tenth centuries, at least among the Anglo-Saxons, preserves its original blackness much better than that of succeeding ages; not even excepting the sixteenth and seventeenth, in which it was frequently very bad. Pale ink very rarely occurs before the four last centuries.

Peter Caniparius, professor of medicine, at Venice, wrote a curious book concerning inks, which is now scarce, though there is an edition of it printed in London, in 1660, 4to. The title is, 'De Atramentis cujusconque generis opus sane novum. Hactenus a nemine promulgatum.' This work is divided into six parts, the first of which treats generally of inks made from pyrites, stones, and metals.

The second treats more particularly of inks made from metals and calxes.

The third of ink made from soots and vitriols.

The fourth of the different kinds of inks used by the *librarii* or book-writers, as well as by printers and engravers, and of staining or writing upon marble, stucco or scaliola, and of encaustic modes of writing; as also of liquids for painting or coloring of leather, cloths, linen, and woollen, and for restoring inks that have been defaced by time; as likewise many methods of effacing writing, restoring decayed paper, and of various modes of secret writing.

The fifth part treats of inks for writing made in different countries, of various materials and colors; as from gums, woods, the juice of plants, &c. and also of different kinds of varnishes.

The sixth part treats of the various operations of extracting vitriol, and of its chemical uses.

This work abounds with a great variety of philosophical, chemical, and historical knowledge, and we conceive will give great entertainment to those who wish for information on this subject. Many curious particulars concerning ink will be found in Weckerus 'De Secretis'. This gentleman also gives recipes for making ink of the color of gold and silver, composed as well with those metals as without them; also directions for making variety of inks for secret writing, and for defacing of inks. There are many marvellous particulars in this last-mentioned work, which will not easily gain credit with the judicious part of mankind.

[*Astle.*

The chief requisites for the making of good writing ink, are, 1. Limpidity, so that it may flow freely from the pen. 2. A deep uniform and black color. 3. Durability, so that the letters be not liable to be effaced by age; and, 4. It should be divested of any corrosive quality, by which the substance of the paper may be destroyed, or the writing rendered in any degree illegible. No ink, however, hitherto used, possesses all these properties; hence several ingenious chemists have been induced to make experiments, in order to render it more perfect.

M. Ribaucourt, in the 'Annales de Chimie,' directs eight ounces of Aleppo galls, and four ounces of logwood, to be boiled in twelve pounds of water, till the quantity is reduced to one half; when the liquor should be strained through a linen or hair-sieve into a proper vessel. Four ounces of sulphate of iron (green vitriol); three ounces of gum-arabic; one ounce of sulphate of copper (blue vitriol); and a similar quantity of sugar-candy, are now to be added: the liquid should be frequently shaken, to facilitate the solution of the salts. As soon as these ingredients are perfectly dissolved, the composition is suffered to subside for twenty-four hours; when the ink may be decanted from the gross sediment, and preserved for use in glass or stone bottles, well stopped.

This ink exhibits a purplish black color in the bottles; but the writing performed with it is said to be of a beautiful black cast, which it retains, unaltered, for a considerable length of time. Each quart of the preparation contains:

	oz.	*drs.*	*grs.*
Of Galls	2	5	20
Green vitriol	1	2	40
Logwood	1	2	40
Gum	1	0	0
Blue vitriol	0	2	40
Sugar-candy	0	2	40

M. Ribaucourt is of opinion, that ink thus prepared, may be preserved several years in a state of perfection, without depositing either galls or iron.

The ink commonly used, is manufactured by stationers, according to Dr. Lewis's recipe; but it is ill calculated for keeping, as it deposits a black sediment, while the fluid itself is of a pale color. Each quart of this ink contains:

	oz.	*drs.*	*grs.*
Of Galls	3	0	0
Green vitriol	1	0	0
Logwood	0	5	24
Gum	1	0	0

Neither blue vitriol nor sugar are employed in this preparation. As, however, both the ink made after the latter method, and that compounded according to other recipes, are not adapted to resist the effects of acids, and are consequently by no means fit for records, deeds, and other documents; M. Westrumb recommends the following ingredients, as being well calculated to remedy this inconvenience. He directs one ounce of Brazil-wood, and a similar quantity of gall-nuts, to be boiled in forty-six ounces (somewhat less than three pints) of water till the whole be reduced to thirty-two ounces, or about two quarts.

This decoction is to be poured, while hot, upon half an ounce of copperas, or green vitirol; a quarter of an ounce of gum-arabic, and a similar quantity of white sugar. As soon as a perfect solution of these substances has taken place, one ounce and a quarter of indigo finely pulverized is to be added; together with three quarters of an ounce of the purest lamp-black, previously diluted in one ounce of the best brandy. The whole is to be well incorporated: and, after it has subsided, M. Westrumb asserts that it will form an ink absolutely indestructible by acids.

A more simple composition, is that proposed by M. Bosse, who directs one ounce of Brazil-wood to be boiled in twelve ounces of water, with half an ounce of alum, till the liquid be reduced to eight ounces; when one ounce of calcined manganese is to be mixed with half an ounce of gum-arabic, and added to the liquor, which should be previously decanted, in order to render it perfectly limpid. This preparation is said to possess the property of being indelible by the use of any kind of acid, and to be superior to that proposed by M. Westrumb.

A durable ink may also be prepared by washing paper, parchment, &c. with the Prussic acid, which will not in the least injure either of these substances. The materials, thus prepared, may be written on with common ink, and a ground of Prussian blue will be formed beneath every stroke, which will remain long after the black has decayed by the influence of the air, or been destroyed by acids.

The latest, and perhaps most simple, preparation of black ink, is that contrived by Van Mons, who observed that sulphate of iron, or green vitriol, when calcined till it becomes white, uniformly afforded a very beautiful black precipitate. According to his experiments, the following ingredients produced an excellent writing ink: four ounces of galls, two ounces and a half of calcined vitriol of iron perfectly white, and two pints of water. The whole was infused in a cold place for twenty-four hours; adding ten drachms of pulverized gum-arabic, and preserving it in a glass bottle or glazed earthen vessel, slightly covered with paper.

Van Mons has applied the discoveries of Proust to the preparation of common writing ink. He has found that the sulphate of iron calcined to whiteness, always gives a most beautiful black precipitate. By the following mixture, he obtained excellent ink; galls 4 oz.; sulphate of iron calcined to whiteness, 2 1-2 oz.; and two pints of water. The whole must be left to macerate cold for 24 hours: then add gum-arabic 10 drachms, and preserve it in a stone jar open, or covered merely with paper. Chaptal has also employed the calcined sulphate, in connection with the decoction of gall-nuts, and log-wood.

M. Desormeaux, Jun. of Vine court, Spitalfields, who has long been in the habit of preparing ink upon a large scale, has communicated to the Philosophical Magazine, a valuable paper on the subject, from which

the following directions are extracted. In six quarts, beer-measure, of water, (it does not appear of importance whether it be rain, river, or spring water) boil four ounces of the best Campeachy log-wood, chipped very thin across the grain (the boiling may be continued near an hour;) adding from time to time a little boiling water, to compensate for weight by evaporation. Strain the liquor, while hot; suffer it to cool, and make up the quantity equal to five quarts, by the further addition of cold water. To this cold decoction, put one pound avoirdupois weight of blue galls, or 20 oz. of the best galls in sorts, which should be first coarsely bruised; 4 oz. of sulphate of iron, calcined to whiteness; 1-2 oz. of the acetite of copper, which should be triturated in a mortar, moistened by a little of the decoction gradually added till it be brought to the form of a smooth paste, and then thoroughly intermixed with the whole mass. Three ounces of coarse brown sugar and six ounces of good gum Senegal, or Arabic, are also to be added. These several ingredients may be introduced one after the other immediately, contrary to the advice of some, who recommend the gum, &c. to be added when the ink is nearly made; as gum, however, is at present exorbitantly dear, three or four ounces will be found sufficient, with only one and a half ounce of sugar, unless, for particular purposes, it is wanted to bear a higher gloss than common. As the common writing inks are delible by many of the acids, especially the oxymuriatic, several chemists and others, particularly M. Pitel of Minden, Dr. Lenten, Wieglib, Westrumb, Thorey, M. Bosse of Hamburgh, have endeavored to discover a composition which would resist the action of this acid, and most of them have succeeded in the attempt. The two following methods are given by Bosse. 1. Boil 1 oz. of brazil-wood with 12 oz. of water for a quarter of an hour; add 1-2 oz. of alum; evaporate the whole to 8 oz. and mix with the liquor 1 oz. of exceedingly soft finely pulverized manganese, mixed up with 1-2 oz of pulverized gum-arabic; or 2. Boil 4 oz. of brazil-wood, and 3 oz. of coarsely pulverized galls, with 9 oz. of vinegar and as much water, for the space of eight minutes; in the liquor, after being strained, dissolve 1 1-2 oz. of sulphate of iron, and one oz. of gum-arabic; and then add to the whole a solution of 1-2 oz. of indigo in 1 oz. of concentrated sulphuric acid. M. Bosse also prepared an ink from the principal ingredients of common ink, but, instead of the usual liquids, he employed the expressed juice of some plant: those which he found most efficacious were obtained from the leaves of the caper spurge, *Euphorbia, Lathyris, Linn*, the common holly, *Sambucus Niger*, and common grass.—[*Gallery of Nature and Art.*

Lectures for Common Schools.

A deposit has been made with the Life Insurance and Trust Company, in the city of New York, subject to the control of the subscribers and their associates, for the purpose of procuring Lectures, or Essays, on various subjects connected with scientific education, to be read in Common Schools of this State. To carry this purpose into effect, the subscribers give notice that they, or either of them, will receive manuscript essays or lectures, on the following subjects, at any time before the first day of January next; and that, to the author of such of them as shall be selected and approved, by the Superintendent of Common Schools and the subscribers and their associates, there will be paid the premiums hereinafter mentioned.

Should parts of several lectures be taken, the premium for the course of lectures on that particular subject, will be divided among their authors, in proportion to the quantity taken. The lectures are to be adapted to the capacities of children, and are to be divided into portions or sections, one of which can be conveniently read in half an hour.

The following are the subjects, on each of which, a course or series of lectures is now solicited:—

1. On the application of Science to the useful arts—for the best course of lectures on which, a premium of two hundred dollars will be paid.

2. On the principles of Legislation—the premium will be one hundred dollars.

3. On the intellectual, moral and religious instruction of the youth of this State by means of Common Schools—the duty of affording such instruction—and the improvements of which the system may be susceptible—a premium of two hundred and fifty dollars.

It is not expected that the essays will be entirely original, either in matter or manner, but rather that the best authorities will be consulted; and even abstracts of the writings of approved authors will be received, if the original authority is designated. It is not desirable that the lecturer should dwell on detail, except where it may be useful for the purpose of illustration; nor will the brevity, which is essential to the plan, permit full elementary instruction on the subject of the course of essays. General principles and results, and those striking and plain illustrations which will excite attention and inquiry—which will be calculated to deposit in the youthful mind the seeds of knowledge and lead it to investigation and reflection, will best promote the object in view.

It is desired that the authors will not communicate their names with their essays: and that they will not furnish any means by which they may be known, until after the selection is made. They are requested to adopt some motto or fictitious signature; and to accompany their communications with a sealed note, containing the address of the author, on which will be endorsed the motto or signature used in the essay. Such of the notes will be opened, as have an endorsement corresponding with that of the selected lectures, to which a premium shall be awarded: the others with their accompanying essays, will be subject to the direction of their authors.

The lectures selected will be printed and distributed to every common school in this State: and subject from time to time to such use, the authors may, if they please, secure the copy-right of their productions.

Essays will be received from any quarter, either in this country or from abroad, and may be transmitted to either of the subscribers at their charge.

John C. Spencer, Canandaigua, N. Y.; Benjamin F. Butler, Albany, N. Y.; Philo C. Fuller, Genesee, N. Y.

May 20, 1833.—[*American Railroad Journal.*

County Lyceums.

While it is altogether practicable and easy to form a County Lyceum in every county in the Union, it will be difficult and impracticable to organize and sustain associations of teachers in a large proportion of the counties. In many counties in New England, there is not one professional teacher. No one is engaged in teaching for more than three or six months in a year.—Consequently, associations of teachers in those cases cannot be permanent. But by enlisting the interest and aid of others than teachers, the institutions might be permanent, though the teachers for whose benefit they were principally formed were constantly changing.

By this measure there may be *virtually* a permanent association of teachers in every county, even the smallest of the eleven hundred. At each semi-annual or quarterly meeting of the County Lyceum, every teacher in the county may be present, to form acquaintances with each other, and their various modes of teaching; to witness any improvements which may be exhibited, and to unite in plans for their mutual benefit, in such a way, as to give schools and education a rising character from year to year and from month to month.

In a few counties associations of teachers may be formed, either in connection or distinct from a County Lyceum; but as a general measure, no one can doubt for a moment that a Lyceum is the preferable institution.

Upon the principle adopted in many Lyceums, of making teachers members *ex officio*, all the privileges will be secured to them which they could have in separate institutions. They could afford to each other all the aid they could render under any other circumstances, while they had the aid of parents and other friends of schools.

One of the first steps to be taken by a County Lyceum after it is organized, is to procure an agent who is acquainted with the subject of schools and the various modes of teaching, that he may cooperate with other teachers, and where it is practicable and requisite, to give instruction in courses of weekly or semi-monthly instruction. In counties where there is already a supply of schools, such an agent acting under such a body might in many cases double their value at least. In the smallest counties he might give, by a system of circuit teaching, most of the instruction which could be sustained.

If a Lyceum could be organized in every county, and an agent procured by every Lyceum, the way would be prepared to effect a speedy and an important change in the character of American education.

Why not organize the Lyceums at once, on the second Wednesday of September next, and at the same time take measures to procure an agent?

Letter Writing.

A postmaster remarked, not long since, that if he was ever to be a schoolmaster again, the first instruction he should give, would be on letter writing. Most editors probably have daily occasion for the same remark. And, so far as we can judge from observation, no class of the community have greater need of this instruction than the graduates of colleges. We refer particularly to the mechanical part of letter writing; such as placing the date, address, dividing into paragraphs, pointing, closing, folding, directing, &c.

We have often had occasion to remark, that our letters coming from the south, are much better 'got up,' as publishers say, than those from New England. The penmanship and the mechanical part, generally, are executed in much better taste from the former than the latter.

This is a most convenient and proper subject to come before Lyceums. We know of no subject on which one or two familiar practical lectures could be given to greater advantage. By the aid of a black board, and a few sheets of paper to show the various forms of mechanical structure, a lecturer might illustrate to a class of fifty or five hundred, the neatest and most convenient modes, greatly to the benefit of his pupils.

This subject is of itself of sufficient importance to call for a Lyceum in every town and village in the Union.

Geology.

No subject of science is at present spreading through the country with anything near the rapidity of Geology. During the present season, we have heard of a great number of schools which have commenced collections, and some of them exchanges with each other. We now have a certain prospect, that, within a moderate period of time, every school in the Union will have a cabinet of minerals and other specimens of nature, made still more interesting and valuable by those of art.

By placing, side by side, the sulphuret and sulphate of iron, (iron pyrites and copperas,) chromate of iron and chrome yellow, magnesite and epsom salts, pipe clay and alum, copper ore and blue vitriol, with a manual to describe the mode of forming the latter class from the former, a rich source of interesting information would be furnished, both to the lovers of science and art.

When schools are furnished, a national deposit, and a medium of general exchanges, can be made with great ease, of which a beginning is already made in New York by the National Lyceum. At the next anniversary of this society, we expect to find specimens of the natural history of each of the American states, and some from other parts of the globe.

For any school, or any individual, to commence a collection, and to take an active part in a system of national exchanges, they need only to procure a few labelled specimens, which can be had for a trifling sum, and which will enable any person to pursue the subject of collecting, examining, and arranging, without the aid of a teacher.

School Libraries.

We were gratified a few days since, on stepping into a primary school in Charlestown, to learn that the pupils had collected a Library during the present season, of two hundred and fifty volumes. Their interest in the books is of course greatly increased from the fact, that they were procured by their own money and efforts.

Newspapers.

A most remarkable and happy change has taken place in the character of newspapers within a year or two past. Not less than ten or twelve papers with a professed scientific character, have been commenced since the first number of the Lyceum was issued. Numerous other papers, formerly of a political character, now regularly occupy a considerable portion of their columns with scientific matter and various subjects of useful knowledge.

It is truly gratifying to witness more or less of the public journals coming from all the states in the Union, manifesting a decided interest in favor of the diffusion of knowledge.

The interest already exhibited by editors on the subject, is evidently sufficient to lead them to cooperate with each other in relation to some definite objects and measures for the advancement of education. And perhaps there is no subject which admits of so important or so ready a cooperation, as County Lyceums. It is certainly practicable for the friends of education in each of the eleven hundred counties in the states so to concentrate and combine their efforts, as to aid each other in the education of their children, and in the general diffusion of knowledge through our country and the world.

When the friends of education in any county are once associated into a Lyceum, they can readily unite their efforts in favor of any improvement or any measure they may wish to introduce.

How easy for a County Lyceum to supply every school within their district with a cabinet of natural history; or to introduce vocal music as one of their exercises. If a few persons, even three or four, in the smallest county at the west or south, should unite their efforts, how easy it would be for them to procure a lady or gentleman to take charge of their children.

By such an association, children might be provided with instruction a part of the time at least, and constant employment be secured to teachers, and the chilling evil of suspense and uncertainty be in a great measure removed.

We most sincerely hope, that all the friends of education, in all the states, will unite in the formation of County Lyceums, and that editors in particular will render all the aid in their power towards this *previous step* for every other improvement. And who can doubt, that if those newspapers which show a decided interest in education and the diffusion of knowledge, should recommend to their readers to meet at their several county towns on the second Wednesday of September next, that such meetings might be held, and such societies formed?

Wesleyan Lyceum.

The Lyceum under the above title, mentioned in our last, is completely organized, and measures are in progress for forming a variety of departments and classes, so as to secure the personal efforts and self-education of every man, woman, and child, who are members. Ladies are not merely invited guests, but real members, with the expectation that they will take an active and efficient part in some of the exercises, either intellectual, moral, or benevolent; as CHRISTIAN BENEVOLENCE is the corner and foundation stone of the Society. There is a prospect of a large juvenile department.

Copper Mine.

Mahoopeny Copper Mine, situated about six miles from the Susquehanna, on the Mahoopeny creek, in Luzerne county, Pa. is now opened; and from the specimen of the ore, which is very extensive, the yield is expected to be fifty per cent. This is an excellent produce; and will be an addition to the resources of the country.

NATURAL HISTORY.

CONVERSATION VI.

'UNCLE PHILIP, we saw a very strange thing just now; as we were coming, we saw a great many bees flying by us, and each one was carrying a little stone.'

'That was very strange, indeed. Did you find out any thing about them?'

'We asked a man who was near what they did it for, and he said that they carried the stones to prevent the wind, which is blowing pretty fresh, from tossing them about too much.'

'That is a very silly story, boys, though it is a very old one; for I have seen them carrying what you call stones when it was quite calm, and there was no wind to blow them away. The man was very ignorant, or he would have told you another story, which would have been both strange and true.'

'Will you have the goodness, Uncle Philip, to tell us what it meant?'

'Very willingly, boys. What you saw I presume were bees. You remember that I told you there were several kinds of bees; and this one is called the mason-bee. This kind builds his nest of mortar, and was therefore called the mason-bee by Mr. Reaumur first, I believe.'

'Where does it get the mortar, Uncle Philip?'

'It makes it, boys. This kind of bee may be seen flying about, picking up sand, grain by grain, putting it into a heap, gluing them together with a sort of gum out of her own mouth, and building with them a foundation for her house. This little workman commonly builds against the side of a wall between two bricks where the mortar has fallen out; and if you should see one of the nests, it appears exactly like a lump of dry mud which has been thrown wet upon the wall out of a cartrut: but when you examine it closely, you may see a great many small stones in it, more than is common in mud; a hundred people, though, might pass by it, and never think it was any thing more than a lump of dirt, which had been thrown upon the wall when it was wet, and had afterward dried there. You see there is a small hole in it; this leads to a cell inside about an inch deep, and shaped exactly like a lady's thimble; the inside of this cell is polished smooth, and appears like a wall of plaster, except that it has little yellow stains upon it. In making this mortar to build with, the bee will sometimes add earth that is soft to its grains of sand, and when the lump is about the size of a small shot, it takes it up and flies away with it, to work it into the wall.'

'Does it always use sand, Uncle Philip?'

'Not always: sometimes it takes wet clay, and will dig into a bank of clay baked hard by the sun on the outside, so as to get that which is wet.

'Mr. Rennie, a gentleman in England who is very fond of watching insects, and has found out a great many curious things about them, has given an account of some of these bees which he noticed at work. Every one was carrying out of a hole in the clay-bank a small lump of clay; and on catching one of them, he found that this lump was wetter than the clay in the hole, so that the bee had moistened it, and worked it together, to make it stick like good mortar. These lumps too were larger than a shot; they were as large as a garden-pea.'

'How long did it take them to work up the lump?'

'About half a minute, Mr. Rennie says. He watched one of these little creatures, and found that she was building on the inside wall of a coal-house, where the bricks and mortar were left rough: she was at work between two of the bricks where the mortar had fallen out, or where the bee had taken it out. And the conduct of the bee at her house was very different from what it was at the clay-bank. She was not frightened, but went on working when any one came near the clay bank; but at her house she seemed afraid that it should be found out where it was. She would alight first on the roof outside, as if she merely wished to rest herself; and when she flew into the coal-house she would not go directly to her nest, but would settle on a shelf, and sometimes pretend to be examining a great many places in the wall between different bricks; and at last, when she supposed there was no risk, or when there was nothing to alarm her, she would fly to her nest, and go to work with all her might in fixing her piece of clay to the wall.'

'Why did she wish her house not to be found out, Uncle Philip?'

'Mr. Rennie supposed it was her instinct; she had seen probably some of the insects which would destroy her young, watching her to see where she was building; and sometimes after flying nearly to her nest with a load, she would turn back and fly towards the clay-bank or take a large sweep off in another direction, and so come to her house.

'Besides the mason-bee, boys, there is the mason-wasp, which I have heard some persons call the *dirt-dauber:* it is very common, especially in the southern part of the United States. It works very much like the mason-bee, only it is apt to fix its nest under the eaves of old houses, which I think the mason-bee never does.

'There is also another kind of mason-wasp which will actually break a hard brick. Mr. Rennie says that he saw one at work on a brick of a hard yellow kind. Whether the wasp found a hole in the brick to begin with, he did not know; but if he did he was hard at work making it larger: he would break off a piece as large as a mustard-seed at a time. It seems wonderful that so small an insect should have so much strength.

'I do not know, boys, that the masons we have been talking of, show us any *tools* like those with which men who are masons work, but they show us, at any rate, how to make mortar by kneading or working it together; and they certainly show us that we were not the first who built walls. But there is another kind of mason who works in stone. He picks out the stones which are of proper size, and he fastens them together with mortar really as men do.'

'Pray tell us of him, Uncle Philip.'

'I will. The insect I mean is the caddis-worm, which is to be found sometimes in ponds, and very often in springs of fresh water. There are several sorts of them, but the one I am thinking of now, builds a stone house to live in. These worms are in the habit of making a little tube, sometimes of sand, or shell, or wood, or leaves, or stones, to live in; and their skill consists in joining in these perfectly, and making them stick together. But we are talking now of the caddisworm that uses stones. What the worm has to do is to make a tube out of small stones, that shall have a hollow about as large as a wheat straw, and be perfectly smooth inside. This is a pretty hard task—at least it would be very hard to us. When the stone-mason wishes a stone of a particular size or shape, and cannot find it, he takes his hammer and breaks one until it will suit; but the caddis-worm has no hammer, and must take the stones just as it finds them. The little insect then has to pick out a great many stones before he gets the right one, because they have so many little rough points about them that it is very difficult to get those which will make the tube perfectly smooth inside. Remember, too, that the bottom or lower side of this stone case has to be pretty nearly smooth, so that the worm can drag it along on the bottom of the spring or pond (for it never comes out of it,) and you will see that the picking out of the stones alone is no trifle. But besides this, it has to fasten them together with mortar.'

'And can the worm really do this, Uncle Philip? Will not the water wash the mortar all away?'

'It certainly would if it were like common mortar. It was a long time that men lived before they found out a mortar that would remain, and grow hard under water. When they want to build a wall that is to be under the water, they use a cement which is called pozzolana; it is made of lava out of a volcano, and is water-proof. Our caddis-worm has a cement too, which is better than pozzolana, and though it has been tried, it cannot be melted or dissolved in water.'

'Uncle Philip, you said that sometimes these worms built their nests of other things besides stones; let us hear something of them, if you please.'

'Very willingly, boys. Some build of shells. Some build of leaves, and others of pieces of reed or light bark. And a curious thing about those which build of light pieces of bark or reed is this, that they will make the top-piece come over so as to hide their heads, and prevent you from seeing them. Some build of sand; and then as the house would be so light that the water running from the spring might wash it down and carry it away, the wonderful little creature takes care to anchor it by fastening a pretty large stone to it when it has nearly finished it. And as the worm anchors it when it is too light, so it lightens it when it is too heavy, by fixing a bit of light wood or hollow straw to it to buoy it up.'

'Well, this is truly a wonderful insect, Uncle Philip.'

'Truly so indeed, boys. In all these cases it uses its water-proof cement, and if you break its house to pieces, and will patiently watch, you may see it build another. The insect always lives with its head out of doors, and its body inside; so that its head is firm and hard, while its body is soft.'

'Uncle Philip,' said one of the larger boys, 'there is one thing I have been thinking about, as you have been talking: these little masons have no trowel, but I believe I know of one animal that uses something like that tool.'

'Ah! What animal is it?'

'Why, I was reading the other day something about the beavers building their dams and their houses, and the book said that they built their houses of logs first, and then plastered them with mud, and that they used their tails for trowels.'

'I am very glad to find that you remember what you read; but I am sorry that your book did not tell the truth. There have been very strange stories told about the beaver; and these stories have been taken from one book and printed in another, so that an untrue account has gone down for a great many years. The beaver is very ingenious, but is not quite so much of a mason as you suppose.'

'Well, Uncle Philip, will you tell us the truth about it?'

'Yes, boys, I will, so far as I know it myself. I have seen these animals, for they were once a great deal more common in our country than they are now: and many of the stories told of them are not true. But before I begin, let me tell you of one book which I think does tell the plain truth about them: and the truth is curious enough.'

'What book is it, Uncle Philip?'

'It is a book written on American Natural History, by Doctor John Godman. I knew him, boys, and a most excellent man he was. He is now dead—and he died a Christian. The book he wrote you will find worth reading, when you get old enough to understand it. But now for the beaver.

'His tail is very broad and flat at the end, and might be used very well for a trowel; but when he builds his house he does not cut down trees, and place them at first, and then fill up the cracks with mud-mortar; but all the sticks and mud (and stones too when the beaver can get them,) are first mixed up together, and the beaver builds his house with this from the very foundation. As soon as he has placed a lump of this stuff upon the wall, he turns round and gives it a blow with his flat tail; and that, boys, is all he does with his tail for a trowel. Sometimes he slaps his tail upon the water when he is swimming; and some persons have supposed that this was done by the king, or ruler, to call his workmen. It may be so, but I do not believe it, because they almost always dive as soon as they have slapped the water; and I think it is probably a part of their motion in diving. In the autumn they cover the outside of their houses with mud, and they walk over it as they are at work, and their tails drag along upon it; and this I expect made persons first suppose that they were plastering it, with the tail for a trowel. When they are caught and kept, boys, they still keep up this fashion of slapping with the tail; so that I rather think it is part of the nature of the animal.

'At another time, perhaps, I will tell you more about the beaver; but it is now late, and I must bid you good morning.'

'Good day, Uncle Philip.'

SOUND, AND ITS VELOCITY.

THE elucidations of the different degrees of velocity, which I have had the honor to lay before you, carry me forward to the examination of sound, or noise in general. It must be remarked, that a certain portion of time always intervenes before sound can reach our ears, and that this time is longer in proportion to our distance from the place where the sound is produced: a second of time being requisite to convey sound 1142 feet.

When a cannon is fired, those who are at a distance do not hear the report for some time after they have seen the flash. Those who are about five miles off, or 26,400 feet distant, do not hear the report till 23 seconds after they see the flash. You must no doubt have frequently remarked, that the noise of thunder does not reach the ear for some time after the lightning; and it is by this we are enabled to calculate our distance from the place where the thunder is generated. If, for example, we observe that 20 seconds intervene between the flash and the thunder-clap, we may conclude that the seat of the thunder is 22,840 feet distant, allowing 1142 feet of distance for every second of time. This primary property leads us to inquire in what sound consists. Whether its nature is similar to that of smell—that is, whether sound issues from the body which produces it, as smell is emitted from the flower, by filling the air with subtile exhalations, calculated to affect our sense of smelling. The opinion was formerly entertained; but it is now demonstrated, that from a bell struck nothing proceeds that is conveyed to our ear, and that the body which produces sound loses no part of its substance. When we look upon a bell that is struck, or the string of an instrument when touched, we perceive that these bodies are then in a state of trembling, or agitation, by which all their parts are affected; and that all bodies susceptible of such agitation of their parts likewise produce sound. These shakings or vibrations are visible in the string of an instrument when it is not too small. It must be observed, that these vibrations put the adjacent air into a similar vibration, which is successively communicated to the more remote parts of the air, till it come at length to strike our organ of hearing. It is the air, then, which receives these vibrations, and which transmits the sound to our ear. Hence it is evident, that the perception of sound is nothing else but the impression made on our ear by the concussion of the air, communicated to us through the organ of hearing: and when we hear the sound of a string touched, our ear receives from the air as many strokes as the string performs vibrations in the same time. Thus, if the string performs 100 vibrations in a second, the ear likewise receives 100 strokes in the same time; and the perception of these strokes is what we call sound. When these strokes succeed each other uniformly, or when their intervals are all equal, the sound is regular, and such as is requisite to music. But when the strokes succeed unequally, or when their intervals are unequal among themselves, an irregular noise, incompatible with music, is the result. On considering somewhat more attentively the musical sounds, whose vibrations take place equally, I remark first, that when the vibrations, as well as the strokes impressed on the ear, are more or less strong, no other difference of sound results from it but that of stronger or weaker, which produces the distinction termed by musicians, *forte et piano*. But there is a difference much more essential when the vibrations are more or less rapid—that is, when more or fewer of them are performed in a second. When one string makes 100 vibrations in a second, and another string makes 200 vibrations in the same time, their sounds are essentially different; the former is lower or more flat, and the other higher or more sharp. Such is the real difference between the flat and sharp sounds, on which all music hinges, and which teaches how to combine sounds different in respect of flatness and sharpness, but in such a manner as to produce an agreeable harmony. In the flat sounds there are fewer vibrations in the same time than in the sharp sounds; and every key of the harpsichord contains a certain and determinate number of vibrations which are completed in a second. Thus the note marked by the letter C makes nearly 100 vibrations in a second, and the note marked ||| makes 1600 vibrations in the same space of time. A string which vibrates 100 times in a second will give precisely the note C; and if it vibrated only 50 times, the note would be lower or more flat. But with regard to our ear, there are certain limits beyond which sound is no longer perceptible. It would appear that we are incapable of determining either the sound of a string which makes less than 30 vibrations in a second, because it is too low; or that of a string which would make more than 7552 in a second, because such a note would be too high.—*Euler's Letters.*

MAGIC.

MAGIC, originally signified only the knowledge of the more sublime parts of philosophy; but as the magi likewise professed astrology, divination, and sorcery, the term magi became odious, being used to signify an unlawful diabolical kind of science, acquired by the assistance of the devil and departed souls.

Natural magic is only the application of natural philosophy to the production of surprising but yet natural effects. The common natural magic, found in books, gives us merely some childish and superstitious traditions of the sympathies of things, or of their occult and peculiar properties; which are usually intermixed with many trifling experiments, admired rather for their disguise than for themselves.

QUESTIONS

ON THE LAST NUMBER OF THE LYCEUM.

WHAT use is made of dogs by the inhabitants of Kamtschatka?

In what season of the year are these animals found most useful?

How many dogs are harnessed into one team?

What other animals are found in Kamtschatka?

What characters and professions are highly esteemed in that country?

What books would be useful to read before 'MOTHERS' LYCEUMS?'

What other methods besides reading, could be adopted by Mothers' Lyceums for their mutual improvement?

How many general divisions may be made of the laws of nature according to Arnott?

What operations of nature come under the division of physics?

What advantages may be anticipated from the cooperation of schools?

What are some of the prominent features of the Boston Wesleyan Lyceum?

How many rains occurred in Savannah, Geo. during the month of May?

From what other place in Georgia, except Savannah, has a meteorological table been sent to the Family Lyceum?

What science is a handmaid to chemistry?

Which resolves substances into their elements, chemistry or philosophy?

What are the different parts of a pump? and what the difference between a suction pump and a forcing pump?

Which will raise water highest?

By whom was a bequest made for procuring lectures for common schools?